Chapter 1

A Survey of Computer Graphics

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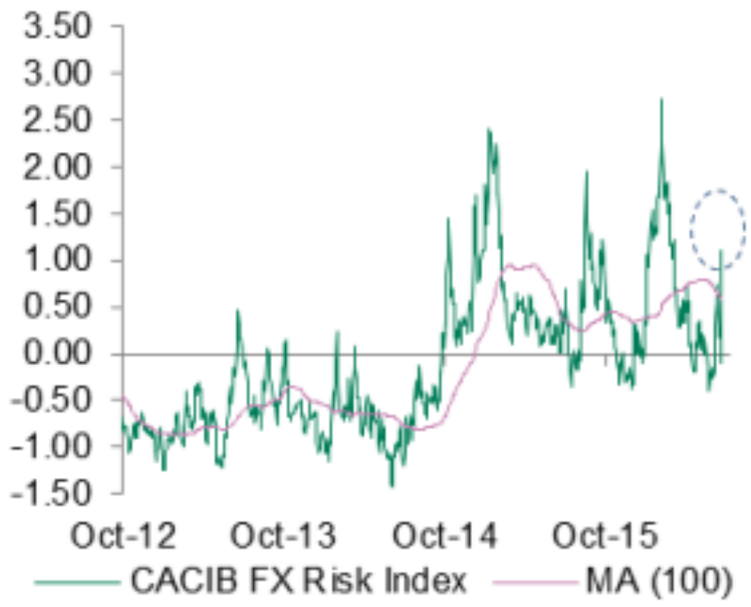
1.1 Graphs and Charts

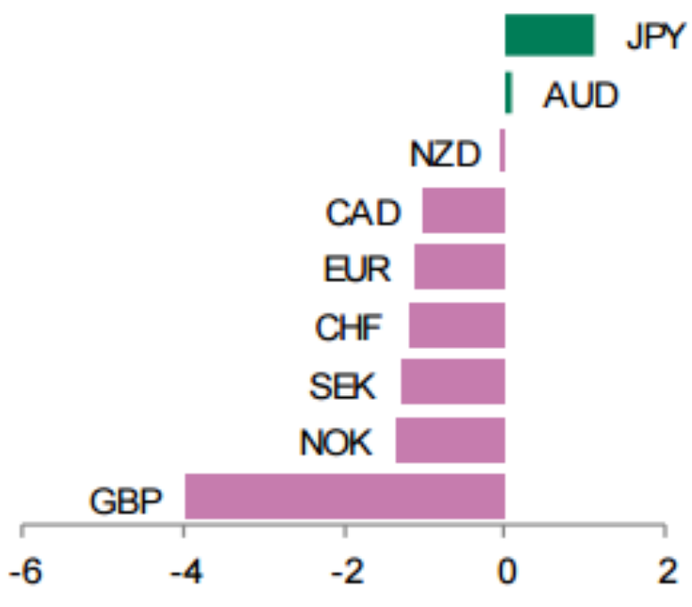
- **Graphs and charts** are commonly used to summarize financial, statistical, mathematical, scientific, engineering, and economic data for research repots, managerial summaries, consumer information bulletins, and other types of publications.

Brexit drives risk aversion



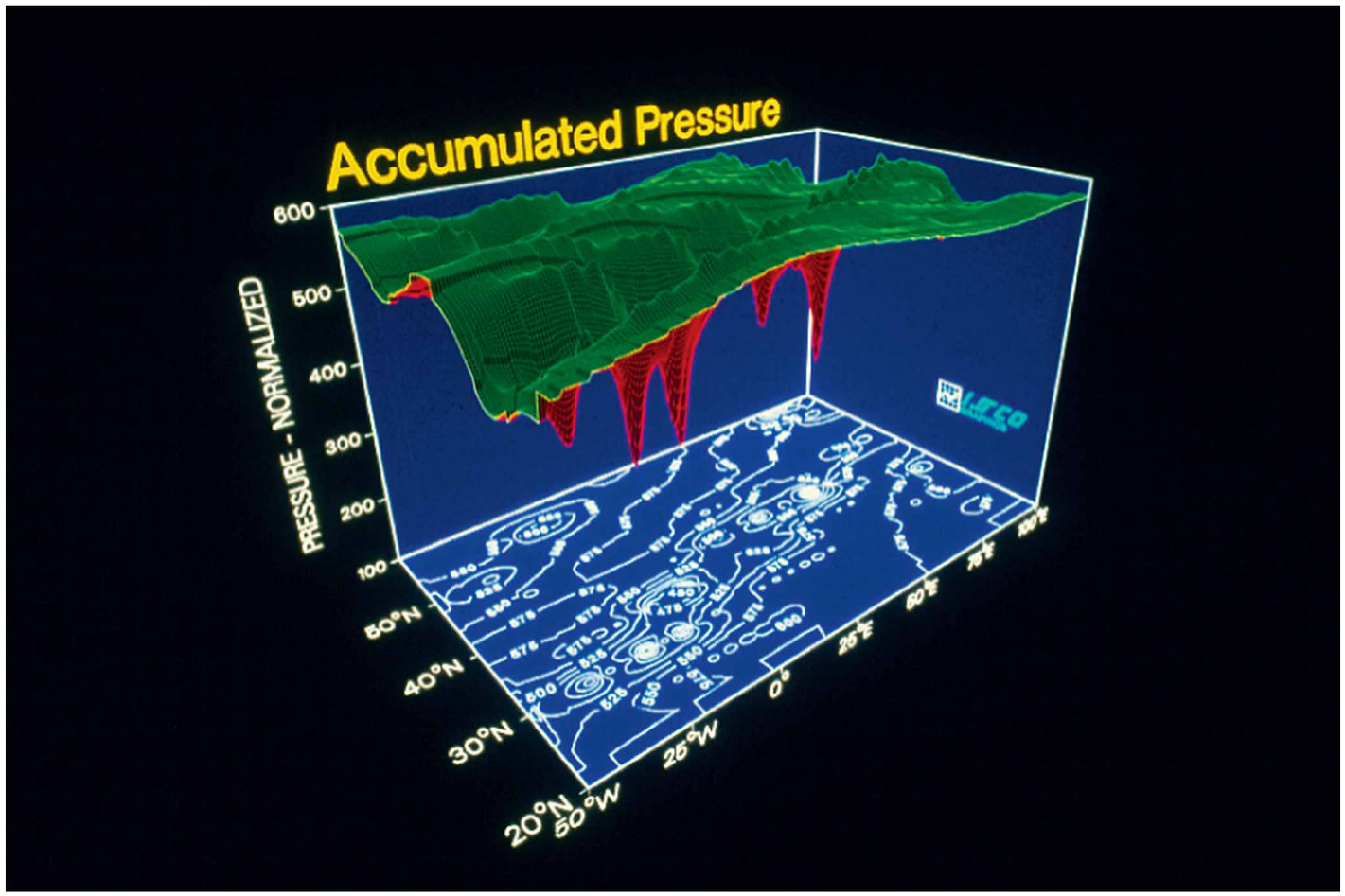
Source: Crédit Agricole CIB, Bloomberg

5 day performance (vs USD)



Source: Crédit Agricole CIB, Bloomberg

- **Three-Dimensional Graphs and Charts**
  - More dramatic or more attractive presentations of the data relationships.

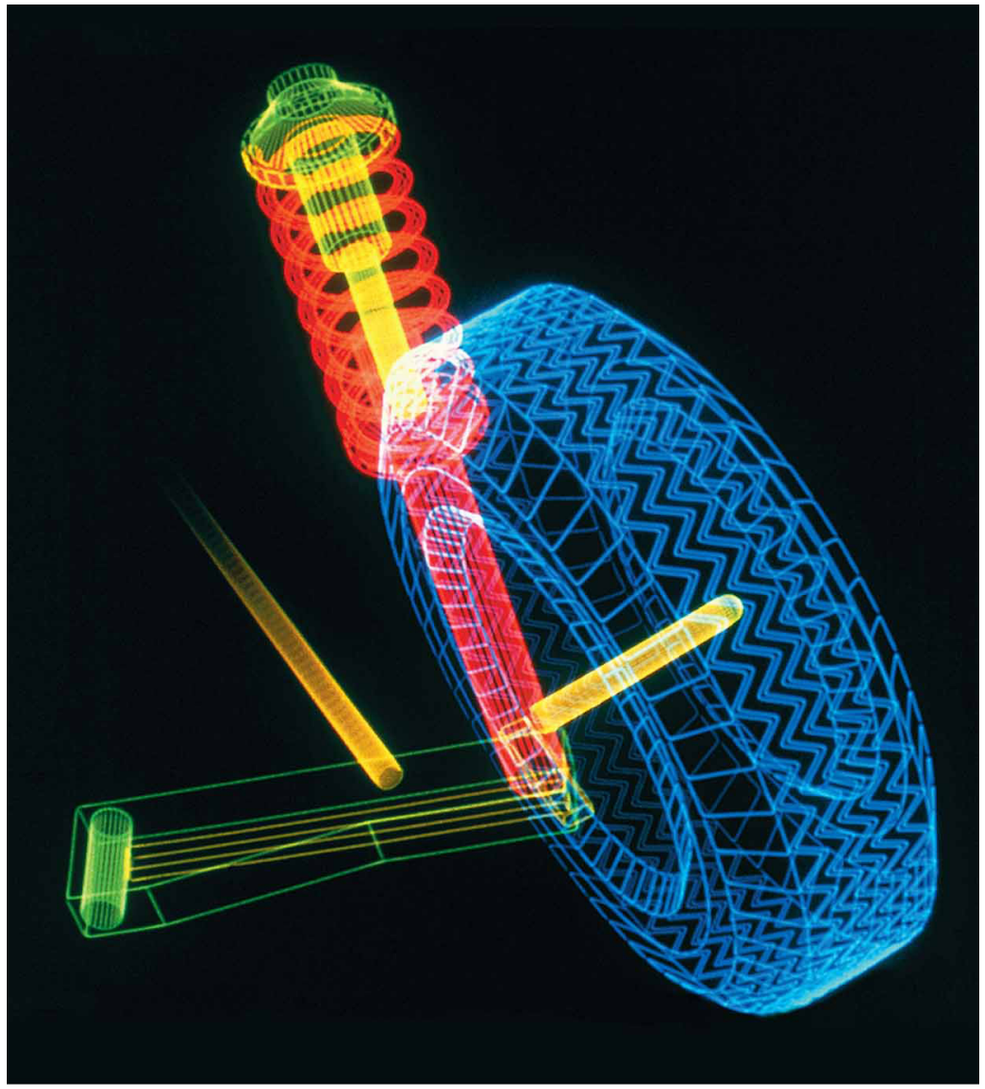


1.2 Computer-Aided Design

- A major use of computer graphics is in design processes.
- Generally referred to as **computer-aided design** (CAD) or **computer-aided drafting and design** (CADD), these methods are now routinely used in the design of buildings, automobiles, aircraft, spacecraft, computers, textiles, home appliances, and many other products.

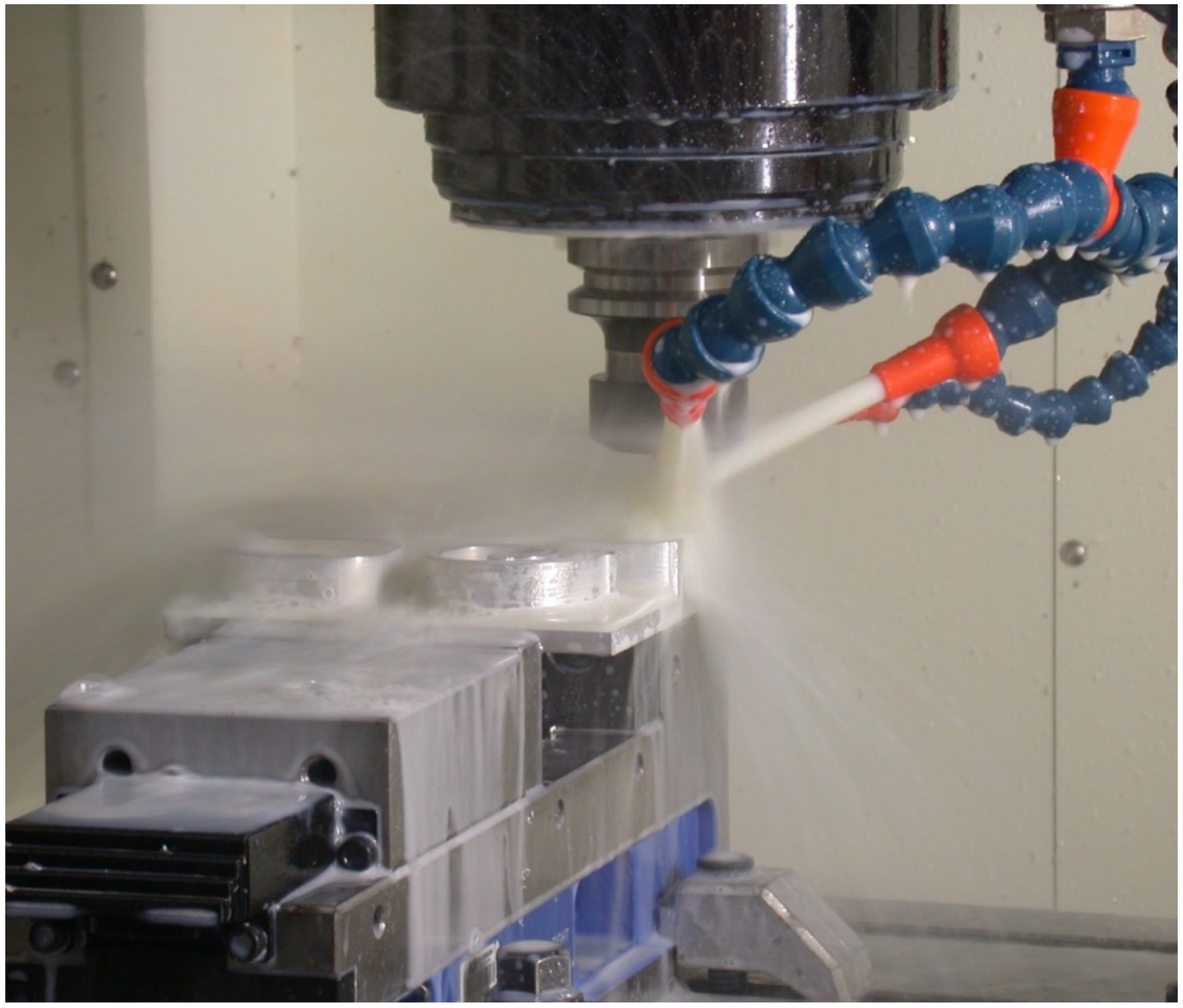
- **Wire-Frame Outline**
  - Show the overall shape and internal features of the objects.

Color-coded, wire-frame display for an automobile wheel assembly. (Courtesy of Evans & Sutherland.)



- **Computer-Aided Manufacturing (CAM)**

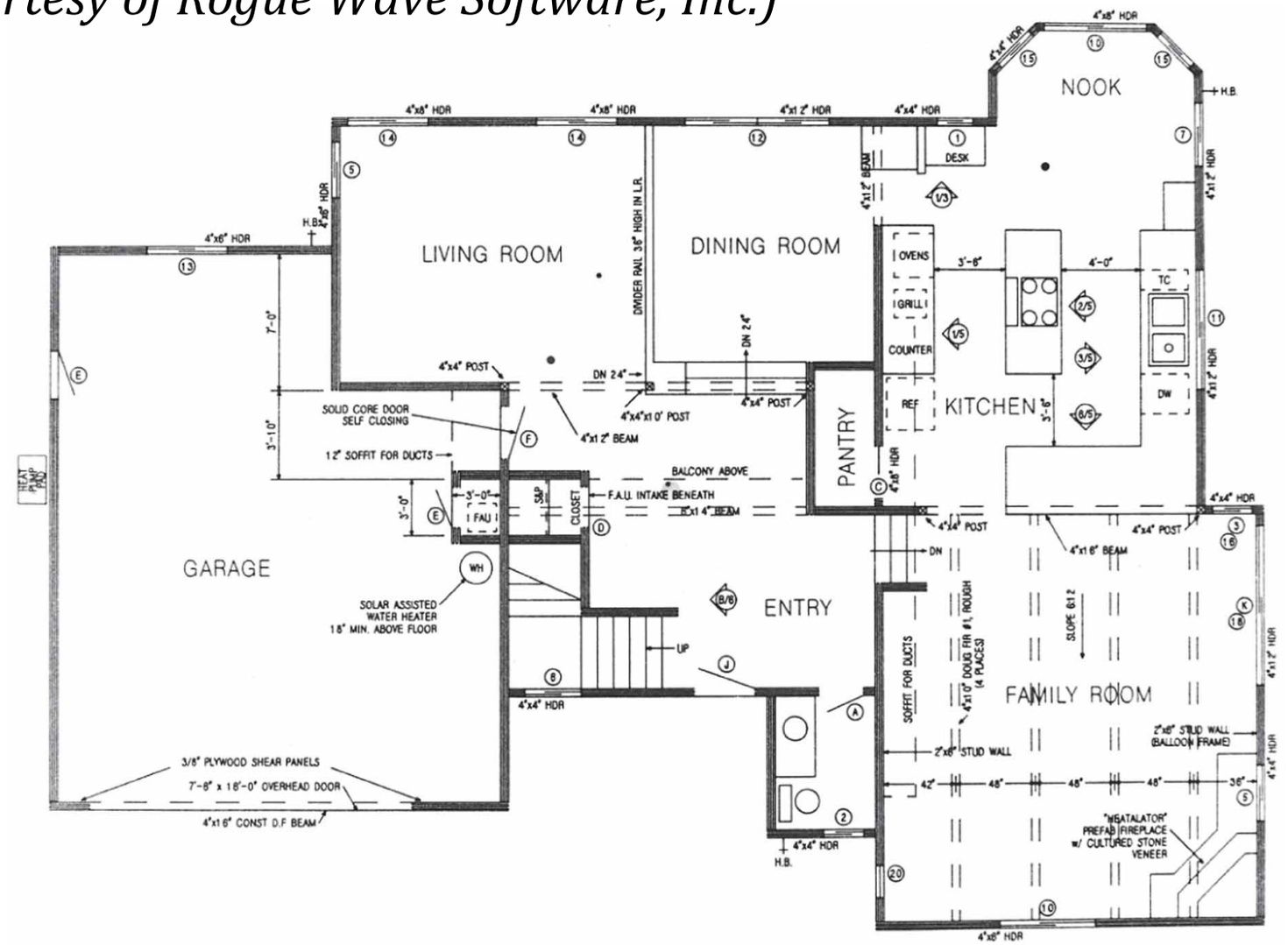
Computer Numerical Control, also known as CNC, is a manufacturing process involving computers that control machine tools.



- **Interactive Computer-Graphics Method**

  - Architecture

Architectural CAD layout for a building design.
(Courtesy of Rogue Wave Software, Inc.)



- **Realistic Displays**

Three-dimensional renderings of building designs. (a) A cross-sectional model of a house with structural problems (Dorling Kindersley.) (b) An exterior view of a modern luxury house (Zastol'skiy Victor Leonidovich/Shutterstock.)

(a)

(b)

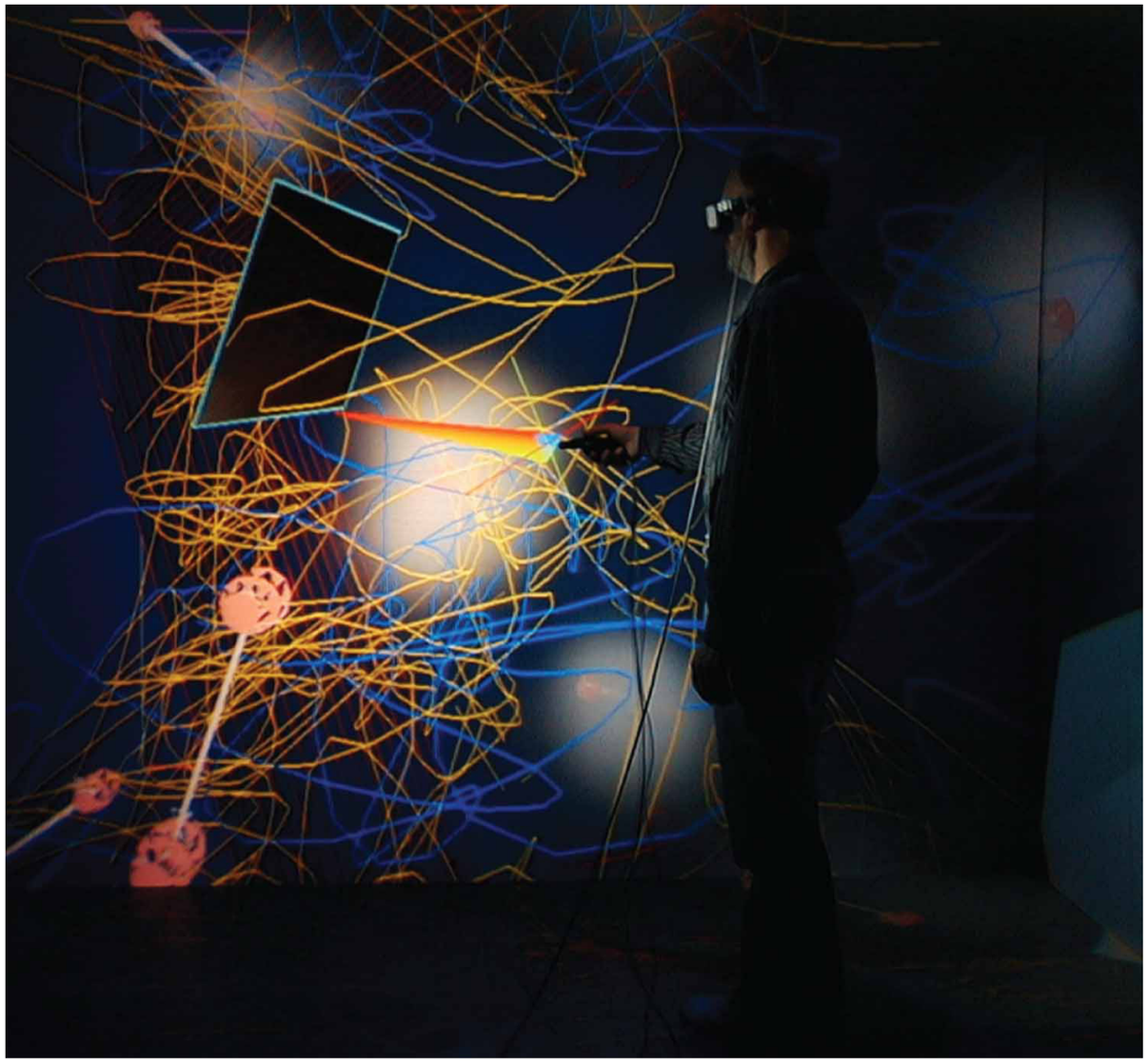
- **Realistic Displays**

A realistic room display, achieved with a perspective projection, illumination effects, and selected surface properties. (Courtesy of John Snyder, Jed Lengyel, Devendra Kalra, and Al Barr, California Institute of Technology. ©1992 Caltech.)

1.3 Virtual-Reality Environments

- A user can interact with the objects in a three-dimensional scene.

A scientist interacting with stereoscopic views of molecular structures

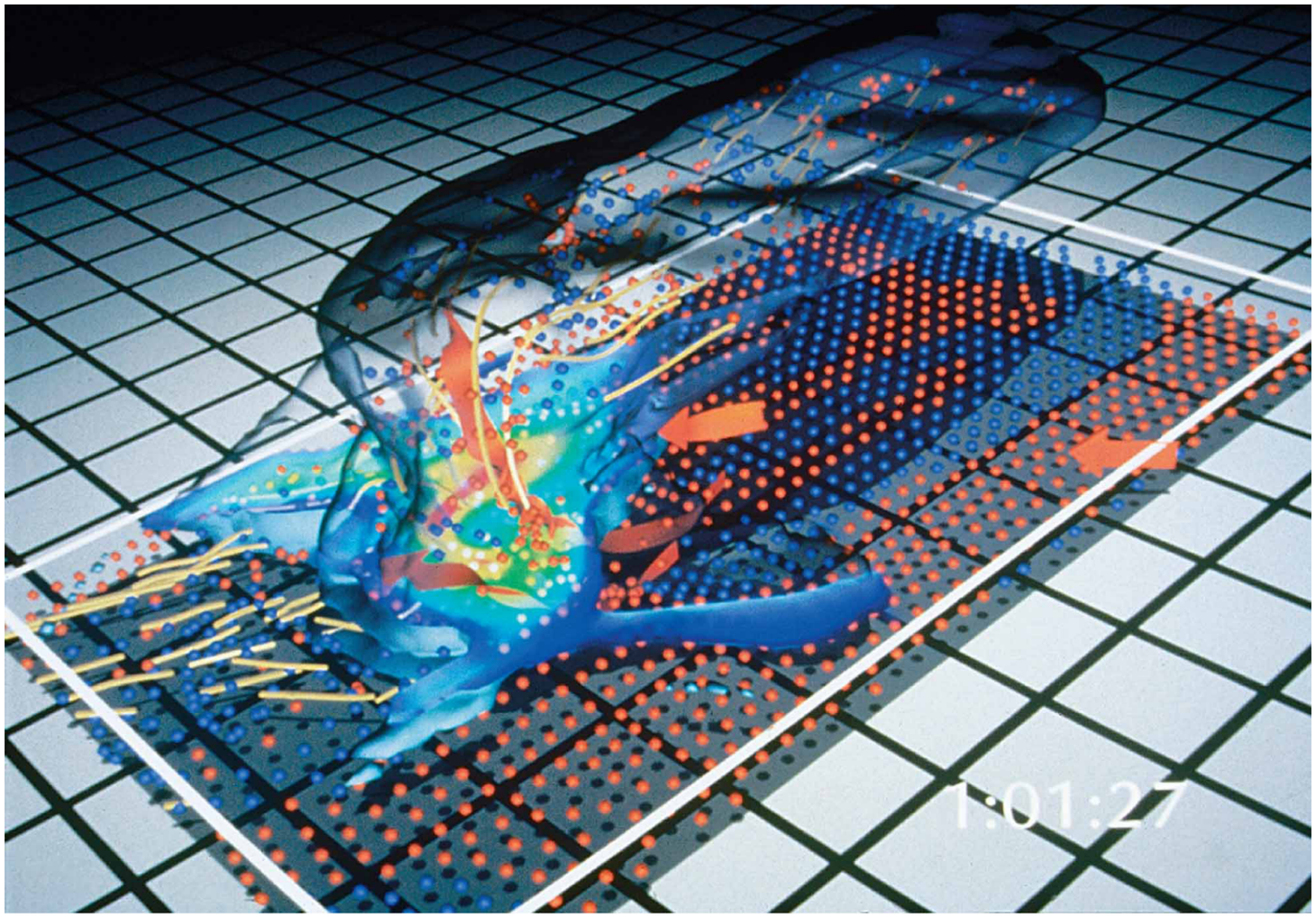


1.4 Data Visualizations

- Producing graphical representations for scientific, engineering, and medical data sets and processes is generally referred to as **scientific visualization**.
- The term **business visualization** is used in connection with data sets related to commerce, industry, and other **nonscientific areas**.

- **Complex Processes and Math Functions**

Numerical model of airflow inside a thunderstorm. (Courtesy of the National Center for Supercomputing Applications (NCSA) and the Board of Trustees of the University of Illinois.)



1.5 Education and Training

- *Education*: Computer-generated models of physical, financial, political, social, economic, and other systems are often used as educational aids.
- *Training*: the simulators for practice sessions or training of ship captains, aircraft pilots, heavy-equipment operators, and air-traffic-control personnel.

1.6 Computer Art

- Both fine art and commercial art use computer-graphics methods.

- Methods and Tools: Lumena, Mathematica, CAD, animation systems

- **Paintbrush program**

An electronic watercolor, painted by John Derry of Time Arts, Inc., using a cordless, pressure-sensitive stylus and Lumena gouache-brush software. (Courtesy of John Derry. Reprinted by permission of the artist.)

- **“Mathematical” Art**

New Taipei City Museum Of Art International Competiton

- **Computer-Generated Animation**

Colossus in *Deadpool*—
completely *CG*

- **Morphing**

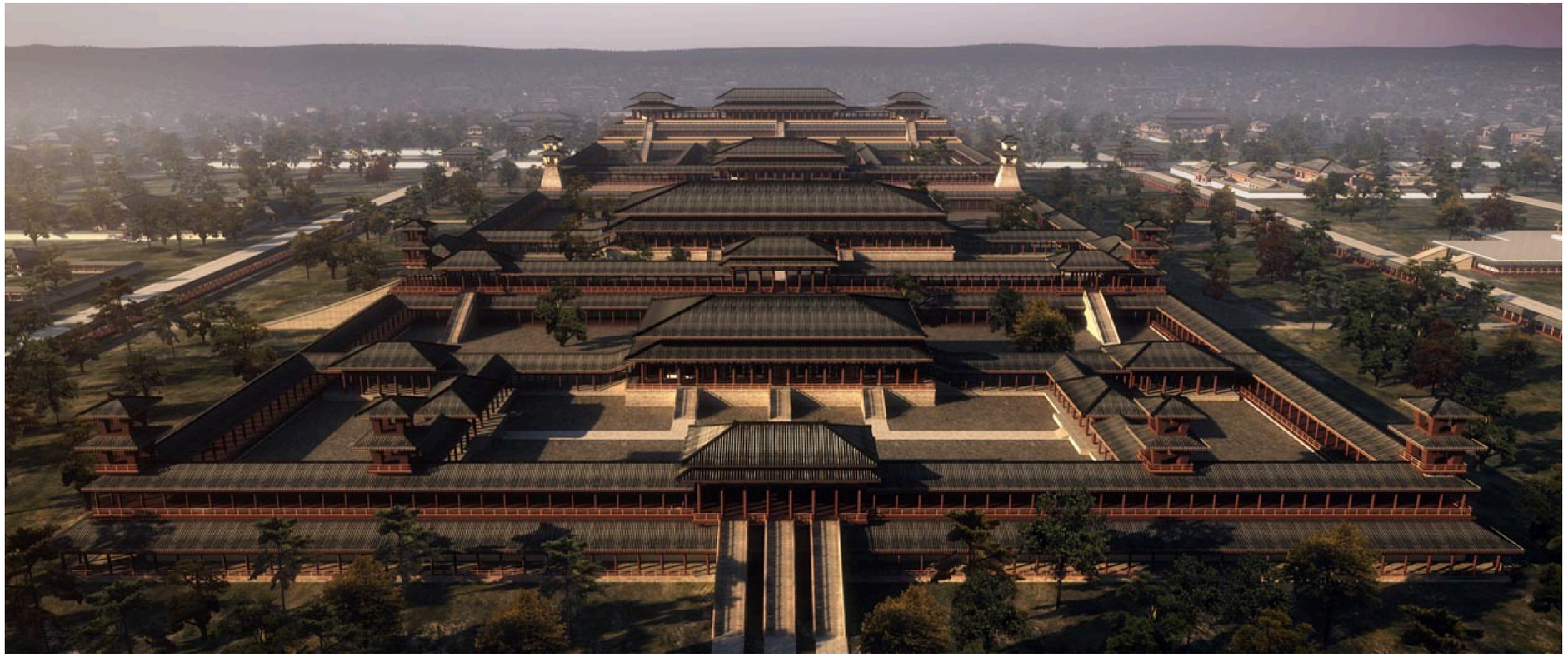
  - **Morphing** is a special effect in motion pictures and animations that changes (or morphs) one image or shape into another through a seamless transition.

Three frames form a morph from George W. Bush to Arnold Schwarzenegger showing the midpoint between the two extremes

1.7 Entertainment

- Television—produce special effects; generate buildings, terrain features

Weiyang Palace was a palace complex, located near the city of Chang'an (modern-day Xi'an)



- Computed-Generated Characters

a 2011 3D motion capture computer-animated epic adventure film based on The Adventures of Tintin

1.8 Image Processing

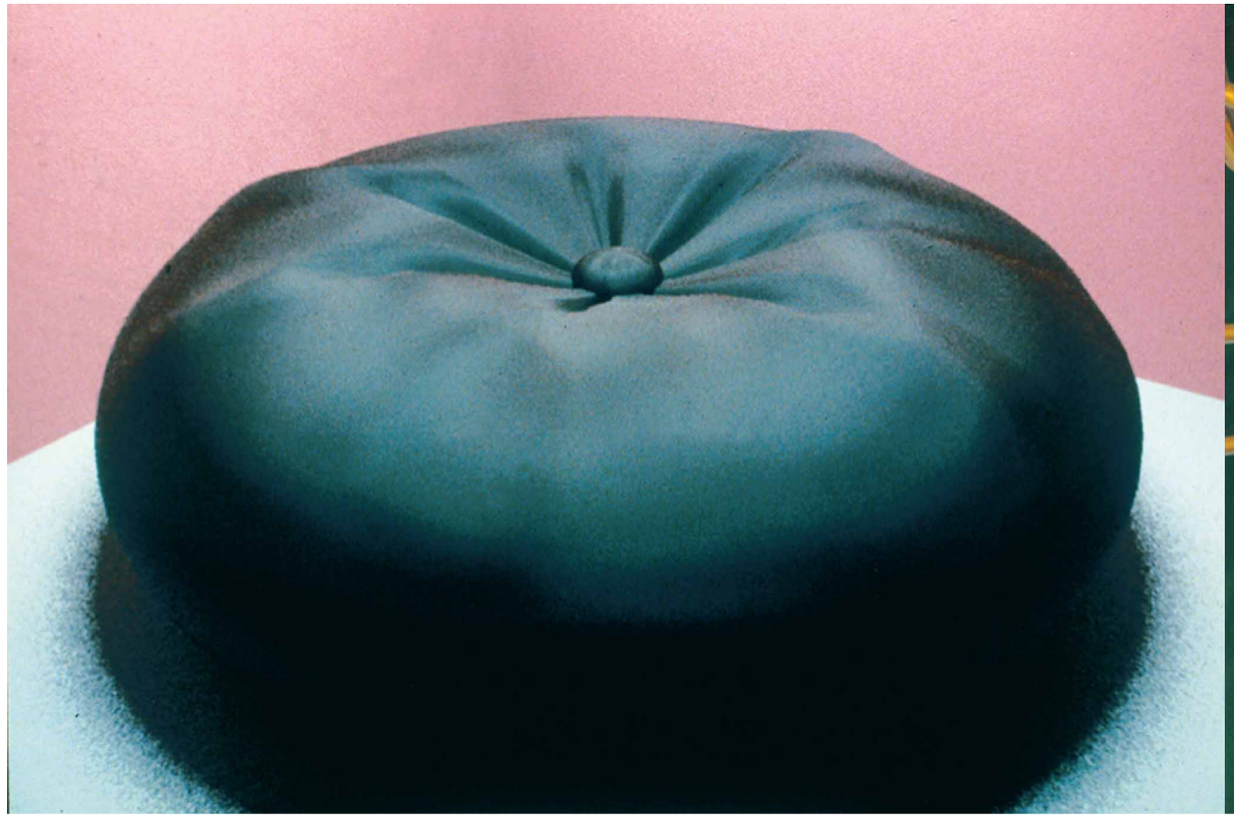
- The modification or interpretation of existing pictures, such as photographs and TV scans, is called **Image Processing**.

- Rearrange picture parts; improve the quality of shading; enhance color separations

- Medical applications: CT, PET, CAT

- **Physically**

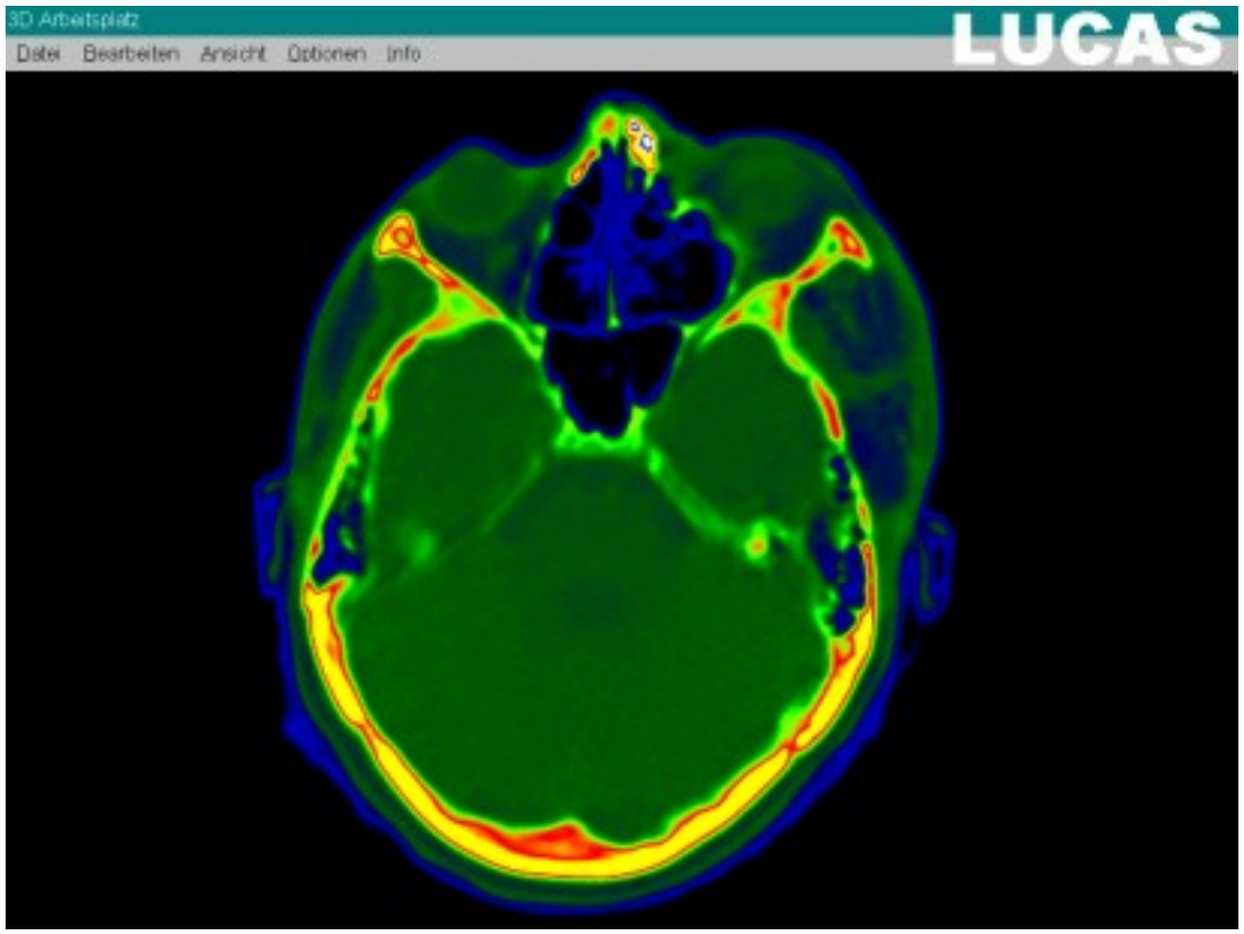
Light reflections from the surface of a black nylon cushion, modeled as woven cloth patterns and rendered using Monte-Carlo ray-tracing methods. (Courtesy of Stephen H. Westin, Program of Computer Graphics, Cornell University.)



Light reflections from trumpets with reflectance parameters set to simulate shiny brass surfaces. (Courtesy of SOFTIMAGE, Inc.)

- **Medical**

Image gathering ("segmentation") on the LUCAS workstation



1.9 Graphical User Interfaces

- A major component of a GUI is a window manager that allows a user to display multiple, rectangular screen areas, called *display windows*.
- An **icon** is a graphical symbol that is often designed to suggest the option it represents

- **GUI**


SkinPlant.com :: Custom Application Skinning and Interface Design - Mi...
Control Panel
File Edit View Favorites Tools Help
Back Search Folders
Address Control Panel Go Links
Control Panel
Switch to Classic View
See Also
Windows Update
Help and Support
Other Control Panel Options
Pick a category
Appearance and Themes
Printers and Other Hardware
Network and Internet Connections
User Accounts
Add or Remove Programs
Date, Time, Language, and Regional Options
Sounds, Speech, and Audio Devices
Accessibility Options
Performance and Maintenance
Recording Control
Arrange Icons By
Refresh
Paste
Paste Shortcut
Undo Move Ctrl+Z
New
nView Properties
Properties
Log Off Windows
2004 GUIOLYMPICS
Switch User
Log Off
created by www.skinplant.com
Cancel
Internet Properties
Connections Programs Advanced
General Security Privacy Content
Home page
You can change which page to use for your home page.
Address: http://www.wincustomize.com/
Use Current Use Default Use Blank
Temporary Internet files
Pages you view on the Internet are stored in a special folder for quick viewing later.
Delete Cookies... Delete Files... Settings...
History
The History folder contains links to pages you've visited, for quick access to recently viewed pages.
Days to keep pages in history: 2 Clear History
Colors... Fonts... Languages... Accessibility...
OK Cancel Apply
Mike Bryant
Internet Internet Explorer
E-mail Microsoft Outlook
SkinStudio
Adobe Photoshop
Play UT2004
My Documents
My Pictures
My Music
My Computer
Control Panel
Connect To
Search
Run...
All Programs
Log Off
Turn Off Computer
Transparent
Minimize
Max/Restore
Close
Roll-up
76% of download.cfm?libid=21&file=St...
Saving:
Stinger_Suite.zip from www.skinplant.com
Estimated time left 12 sec (5.51 MB of 7.21 MB copied)
Download to: C:\Documents and ...\Stinger_Suite.zip
Transfer rate: 134 KB/Sec
Close this dialog box when download completes
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